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TITLE: Microcombustor having submillimeter critical dimensions

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INVENTOR-INFORMATION:

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CLAIMS:

What is claimed is:

1. A microcombustor comprising:

an elongate combustion chamber having submillimetric critical dimensions;

means for inputting combustion fuel into said combustion chamber;

a coating on inside surfaces of said combustion chamber, said coating having a low well-depth to inhibit chemical quenching; and

an exhaust from said combustion chamber.

2. The microcombustor as claimed in claim 1, wherein said combustion chamber is formed in a substrate.3. The microcombustor as claimed in claim 2, wherein said substrate is a wafer formed of SiC.4. The microcombustor as claimed in claim 1, further comprising a preheat section for preheating said fuel before it enters said combustion chamber.5. The microcombustor as claimed in claim 1, wherein said combustion chamber forms a serpentine path.6. The microcombustor as claimed in claim 2, wherein at least one of said substrate and said coating is resistant to corrosion and decomposition at high temperatures.7. The microcombustor as claimed in claim 2, wherein at least one of said substrate and said coating has tensile strength at high temperatures.8. The microcombustor as claimed in claim 2, wherein at least one of said substrate and said coating is creep resistant.

9. The microcombustor as claimed in claim 2, wherein at least one of said substrate and said coating is resistant to failure due to thermal stresses.

10. The microcombustor as claimed in claim 1, wherein said coating comprises $\text{SiO}_2 + \text{Al}_2\text{O}_3$ (mullite).

11. The microcombustor as claimed in claim 1, wherein said combustion chamber is formed in a wafer and said microcombustor further comprises at least two enclosure wafers for thermally isolating said combustion chamber.

12. A microcombustor comprising:

a central wafer having an elongate channel formed therein, said channel having a submillimetric diameter;

at least two enclosure wafers, one disposed on each side of said central wafer;

at least one inlet for inletting at least one reactant etched into at least one of said enclosure wafers;

an inlet penetration of one of said enclosure wafers and in communication with said elongate channel;

an exhaust outlet from said combustion chamber, wherein said channel includes surfaces which inhibit chemical and thermal quenching.

13. The microcombustor as claimed in claim 12, wherein said surfaces are formed from a material chosen using the following approximation for radical trapping probabilities: $\frac{1}{2} \left(\frac{w}{T_s} \right)^2$

where T_g = gas temperature, T_s = surface temperature and w = well depth, said coatings being chosen such that w is below approximately 40 kcal/mole.

14. The microcombustor according to claim 12, wherein said surfaces minimize heat transfer.

15. The microcombustor according to claim 12, wherein said central wafer includes side thermal isolation cavities around said surfaces.

16. The microcombustor according to claim 15, wherein said side thermal isolation cavities include a plurality of reflectors surrounded by a plurality of vacuum cavities, such that said combustion chamber is thermally isolated.